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(72) Walden, Michael - U.S.A. ;

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(71)(72) Applicant and Inventor: WALDEN, Michael [US/US]; Apartment A, 1224 Drexel Avenue, Drexel Hill, PA 19026 (US).

(74) Agent: DONOHUE, John, P., Jr.; Woodcock Washburn Kurtz Mackiewicz & Norris, One Liberty Place - 46th Floor, Philadelphia, PA 19103 (US).

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(57) Abstract

Apparatus and method are described for a proactive system for assisting the computer operations of an organization. The proactive system is shown to include a dictionary of operations (10) of said organization, an organizer (10) for organizing information entered at a first input/output device (18) in accordance with the dictionary of operations; and a transmitter (10) for transmitting organized information to a second input/output device (18) whenever the organization of information in accordance with the dictionary requires information to be transmitted. In one embodiment, the organizer (10) associates a current identifier to the information while the information is being organized in accordance with said dictionary.

PROACTIVE USER NETWORK

FIELD OF THE INVENTION

The present invention relates generally to methods and apparatus for assisting operations within a business organization and more particularly to methods and apparatus for automatically managing the flow of work in an organization having computer operations such as a network. Still more particularly, the present invention relates to methods and apparatus for automatically retrieving relevant information to assist a user in accomplishing an assigned task. The invention also relates to methods and apparatus for monitoring work product of and the flow of work between, users of a computer network and for providing data reflecting the users' efficiency.

BACKGROUND OF THE INVENTION

For purposes of illustrating the invention and its use, a manufacturing plant environment is assumed as the subject business organization. As will be understood, in such an environment, multiple departments will interact with each other. For example, Shipping-Receiving, Quality Control, Stockroom, Procurement, Production Control, Production, Cost Accounting, Accounts Payable, Accounts Receivable, General Accounting and Engineering, must interact with each other to accomplish a variety of tasks that arise in the course of doing business, thereby causing work to flow between these departments.

level management can recognize bottlenecks and areas of inefficiency and adapt the organization to avoid such bottlenecks and inefficiencies.

Accordingly, a primary goal of the present invention is to provide a system for efficient automatic distribution of tasks to network users. A further goal of the present invention is to provide a system for automatically (proactively) providing a network user with relevant information for use in carrying out an assigned task. Another goal of the present invention is to provide a system for automatically tracking the status of a task, i.e., tracking its stage of completion and who has contributed to its completion. Still another goal of the present invention is to provide a system that provides data reflecting the users' efficiency in carrying out assigned tasks and furthers the company's management's ability to recognize areas of inefficiency and adapt the organization to avoid such inefficiencies. Yet another goal of the present invention is to provide a Pro-Active User Network (PAUN) facilitating the achievement of the foregoing goals.

SUMMARY OF THE INVENTION

The above mentioned goals are achieved in apparatus and methods for a proactive system for assisting the computer operations of an organization. The proactive system includes a dictionary of operations of said organization, an organizer for organizing information entered at a first input/output device or terminal in accordance with the dictionary of operations; and a transmitter for transmitting organized information to a second input/output device or terminal whenever the organization of information in accordance with the dictionary requires information to be transmitted to the second input/output device. In one embodiment, the organizer associates a current identifier to the information while the information is being organized in accordance with said dictionary. A storage device for storing information organized by the organizer is also disclosed. In such an embodiment, the organizer retrieves information based on

identifiers associated with stored information, wherein the information to be retrieved has an identifier having a desired relationship to the current identifier. The retrieval operation is preferably performed in response to a prompt at either the first or second input/output device. Information location operations preferably recognize desired characteristics, such as the recognition of associated code, in the information stored in the storage device. It is also preferred for the proactive process to be tracked, whereby the time it takes for information to be processed at the second input/output device or whether the information is forwarded to a third input/output device is monitored. It is preferred for a report to be generated describing the tracking and monitoring operations.

In a preferred embodiment of the invention, task related information will include an identifier such as an account/project code indicative of an account with which the assigned task is associated. In addition, the use of memory will facilitate storage of a database including a plurality of files, each file preferably being located or named such that the user who created it, the account/project to which it relates and the application with which it was created are determinable from the file's name and/or location. In this embodiment the retrieving portion of the invention displays on the second input/output device each file whose location or name bears a prescribed relation to the task related information initiated at the first input/output device.

The task related information may advantageously further include a response code (or dispatch code) indicating whether any user is to be notified of the completion of the task. Such response codes form a part of the dictionary of operations and are the primary means for defining whether a task is to be transmitted forward to another user or back to a prior user.

Computer networks constructed in accordance with the invention may also advantageously include the means for forwarding task related information from the second user to a

third user at a third terminal. In addition, such networks may comprise means for automatically tracking or monitoring the flow of work in an organization, i.e., the computer operations. For example, recording data indicative of the time the task related information was sent from the first user to the second user and the time the task was either completed by the second user or the task related information was forwarded by the second user to the third user can be monitored.

Preferred embodiments of the invention may also comprise means for storing task related information sent to the second user in a queue and means for displaying the queue on the second terminal. Preferred embodiments may also comprise means for maintaining a ship/receive (S/R) database to track the status of a task, this database comprising the following fields. These fields are generally described as follows:

1) SOURCE User
2) ALTERNATE User
3) TIME IN
4) APPLICATION Number
5) TIME OUT
6) DATE
7) ACCOUNT Code
8) TASK/PROJECT Code
9) RETURN (logical)
10) DESCRIPTION
11) FILE NAME

A software product, designed in accordance with the present invention, would include instruction code for actively controlling the operation of a computer network. The code would be operative to store data input from network terminals and retrieve data for display on the terminals. The software would also actively assign, automatically route and transmit task related information originated by a first user from a first terminal to a second user at a second terminal, the task related information being indicative of a task assigned to the second user. In certain circumstances the software actively, i.e., without being prompted by a

user, identifies data relevant to the task and displays the relevant data on the second terminal.

It should be understood that the term "task" is used herein to denote work to be accomplished, a communication from one user to another assigning such work, as well as other forms of communications, such as an e-mail message requesting assistance or advice.

Other features of the present invention are described below.

These and other objects and advantages of the invention will become more apparent from the following detailed description when taken in conjunction with the following drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figs. 1A, 1B diagrammatically illustrate a Computer Operations Map (COM) for use in the Pro-Active User Network (PAUN) of the present invention;

Fig. 2 is a diagram illustrating general relationships among the components of the PAUN system in accordance with the present invention;

Fig. 3 is a flowchart illustrating a basic operation of the PAUN system;

Figs. 4A, 4B are a flowchart illustrating a more detailed operation of the PAUN system;

Fig. 5 is a flowchart depicting in more detail the DISPLAY HISTORY block 78 of Figure 4B;

Fig. 6 depicts a file storage convention of the PAUN system; and

Fig. 7 depicts an exemplary directory structure.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The invention is referred to herein as the Pro-Active User Network, or PAUN. Although, it may be possible to implement the invention in firmware or in hardware, for example, in custom designed integrated circuit chips, it is preferred for the invention to be implemented primarily in software for use in a computer operation. An example of a computer program for implementing the PAUN is described

below, particularly with reference to the flowchart of Figures 4A, 4B. In order to better understand the particulars of the invention, consider first an example of the PAUN system in operation.

For purposes of illustration, it is assumed that the PAUN is employed in a manufacturing plant having multiple departments having various interactions. It is noted that the PAUN of the present invention can be adapted to accommodate different sizes and types of organizations.

Consider the situation where an internally designed or specified part, manufactured by an outside vendor, has been received in a damaged condition in the Receiving Department. The Receiving Manager normally would reject and return such a defective part to the vendor. The Receiving Manager enters into the PAUN information representing receipt of this damaged part. Having been previously programmed that these particular damaged parts should be given special consideration rather than being automatically rejected, since this particular part is crucial for meeting a delivery deadline, the PAUN instructs the Receiving Manager to place the damaged part in a particular storage location.

In order to determine whether the part can be repaired in-house and used to meet the delivery deadline, the PAUN is programmed to automatically route a task to the particular Engineer who designed or specified the part indicating that evaluation of the received part is necessary. It is desirable to alert that particular Engineer in order to get the most qualified support. Due to the crucial nature of the damaged part, the PAUN may also be programmed to notify the Production Supervisor in Production Control of receipt of the damaged part. It is noted that the PAUN automatically identifies the appropriate Engineer from relevant, previously stored, design information.

The Engineer will notice a task prompt by the PAUN and respond. Response to the prompt results in the Engineer being informed by the PAUN of the condition of the particular received part as being damaged, that evaluation is necessary

and the location of the received part. The Engineer then makes a determination of the usefulness of the received part.

When the part has been evaluated and approved for use in production, an indication is made by the Engineer to the PAUN. Typically, the Engineer indicates that the task prompted by the PAUN has been completed, by entering an affirmative response in a "task completed" field displayed by the PAUN. The PAUN system is programmed to then notify particular parties or departments in the organization that the part is acceptable for use, including whether the part has been placed in inventory.

As a post-application task, the PAUN is programmed to prompt one of the managers (such as the Quality Control Manager, the Production Supervisor or the Engineering Supervisor) that a damaged part was received from a particular vendor and request that a letter be sent to the vendor regarding a quality problem. If a history of receiving damaged parts over the last 11 months from this particular vendor exists, the PAUN is programmed to also present this information to an appropriate manager. In this example, the Quality Control Manager would most likely receive the prompt and the information.

It should be appreciated from the above that knowledge of the inter-department, inter-personnel communication and organizational operation is critical to the operation of the invention. The PAUN system augments such operation by automatically sending, initiating or routing tasks and messages to appropriate personnel. As will be seen below, such routing is type dependent, i.e., certain types of messages will not be automatically routed. It may be helpful to briefly explore how such communications are accomplished.

As noted previously, the invention resides primarily in software which in turn is operative in relation to a hardware network. In order to facilitate user access to the software, and vice versa, for purposes of achieving automatic sending, initiating, routing or monitoring of tasks, a detailed map of operations, including identification

and/or locations of persons, identification and/or location of departments and a description of how work is to flow between various departments need be provided. Such a map or dictionary of operations is referred to as the Corporate Operations Map (COM) and is diagrammatically depicted in Figs. 1A and 1B. The COM in effect constitutes the operations protocol or dictionary of operations delineating the various paths work and communications are to follow. Through use of the COM, the PAUN may automatically channel communications based on function, i.e., organize information in accordance with the flow indicated in the dictionary of operations (COM) shown in Figs. 1A and 1B. It is noted that the dictionary of operations shown in Figs. 1A and 1B represent the generic operations of a standard manufacturing organization.

One of the first steps to implementing the PAUN is to establish the COM in the system. In this regard, department layout is defined together with the personnel within each department and the terminals available to each department. Based on such information, a communications protocol is defined by which information entered at a terminal may be organized. It is noted that in the preferred embodiment, communications protocol is a dynamic parameter that may change with time in relation to actual use resulting in increased efficiency. Based on the information contained in the COM, automatic routing of standard or repetitive operations is accomplished. For example, suppose blue prints are created by a "drafting" department. Such prints, or information regarding the location and/or status of such prints, can be automatically routed by the PAUN system based on information contained in the COM to the "engineering" department for approval once the user indicates that the task of creating the drawings has been completed. Such information will be organized in accordance with the COM, i.e., the organization or classification of the information in accordance with the COM will provide an indication of where such information needs to be routed.

It is noted at this point that the input/output devices used to enter or be presented with information by the PAUN are described in terms of standard terminals, i.e., a keyboard and display screen. However, the invention is not so limited. The invention is useful in relation to a multi-media system, i.e., a system utilizing input/output devices such as phones, video devices and audio devices. For ease in understanding the description herein, each input/output device can be considered a terminal having a keyboard and a display screen.

In order to facilitate the entry of information into the PAUN, it is preferred for standard screen displays or formats to be established in the COM. For example, when the drafting department enters the PAUN in order to input information regarding the status of drawings, a particular display designed into the COM will be provided.

It will be appreciated from the above that the COM also serves to control access (security) to information generated through use of the PAUN system, as well as being able to identify personal use of the system, i.e., all non-automatically routed tasks or other information can be identified.

It is also preferred for the PAUN system to provide for the mapping or routing of tasks in a fashion that can override the automatic routing function of the COM.

The invention will now be described in greater detail. Referring to Fig. 2, PAUN software 10 provides an interface between Local Area Network (LAN) software 12 and one or more software applications or programs 14. It will be understood that PAUN 10, LAN 12 and applications 14 all operate within the physical parameters of a hardware network, wherein a number of printers, memory devices, workstations, etc., may be electronically interconnected through a file server type device. In such a hardware context, PAUN 10, LAN 12 and application 14 programs may all reside in or be operative through the file server. It is noted, however, that use of the invention is not limited only to such

hardware. The PAUN will also be applicable to other hardware arrangements such as peer-to-peer arrangements, Wide Area Networks (WANs), etc.

Moreover, the processing hardware for implementing the above described software can either include a single central processing unit or may include a distributed processing arrangement. The effect of using the invention with any such hardware arrangement is access by any department to any application and, as shown in Fig. 2, automatic access by PAUN 10, via the COM, to virtually all consoles, inter-organization communications and other information.

Referring again to Fig. 2, LAN software 12 is also shown to be interacting with peripheral devices 16 such as printers, storage devices and the like while applications 14 interface with users through I/O (input/output) devices 18, such as a CRT console. As will be described below, it is also possible for users to access PAUN 10 directly.

It will be appreciated that in order to implement PAUN 10 in an organization such as that depicted in Figs. 1A and 1B, it will be necessary for some form of a data entry and display device such as console 18 to be provided within each department. It is desirable, however, that only one person in each organization be permitted to make changes to the COM. Consequently, it is preferred that a form of master terminal (not shown) be provided for use only by the corporate operations administrator.

It may be appreciated from the above description that PAUN 10 is capable of tracking and/or monitoring all computer operations of a subject organization. As will be described below, it is possible to modify the flow of work in an organization, i.e., modify the COM, based on such tracking capability. Consequently, PAUN 10 can be adapted to provide suggested changes to the COM. Such changes could either be made automatically or only by authorization from the corporate operations administrator.

Referring now to Fig. 3, a flowchart depicting a basic operation of the PAUN system is shown. It is noted that operation of the PAUN is not limited to that specifically shown in Fig. 3, but that, other operations of the PAUN are possible. A first user or originator (not shown), may choose via console 18-1 an account associated with a specified task via account selector 20. Account selector 20 defines a portion of the PAUN software facilitating the selection of an account/project code. The account selection will provide an indication of the type of task to be performed. In view of the nature of the COM, described above, assignment of tasks can now also be automatically implemented. In other words, information entered into the system is organized in accordance with the COM. To this end, account/project selector 20 associates a current identifier or code to the information being organized, thereby resulting in a task. A task will preferably include both a task definition (i.e., a definition of the work to be done) and information associated with the task to be processed.

The originator may also choose an application program with which to accomplish the task. The application program is selected via program selector 22. The implementation of selectors 20 and 22 will be readily apparent to one of ordinary skill in the programming art from the description herein. Therefore, these blocks are not described in detail.

The task chosen at account selector 20 may now be forwarded or transmitted by a transmitter portion of the PAUN to another network user or receiver at an alternate console or terminal 18-2 for further action. As shown in Fig. 3, the task related information entered or selected at console 18-1 is caused to appear at console 18-2 through the operation of PAUN 10 and LAN 12 software. If computer processing of information is necessary, LAN software 12 operates to present data to CPU 24 for processing and to provide processed data back to PAUN 10 for provision to the receiver. Upon

delivery, the receiver can further contribute to the accomplishment of the task. Although not shown, the alternate console 18-2 may repeat this same process so that the receiver effectively becomes an "originator" and the task is accomplished or further supplemented by a further receiver. Such a chain operation is continued until the task is indicated as being completed. Through the use of tracker 11 to monitor the flow of all tasks, PAUN 10 can not only determine which organization personnel are necessary for the completion of certain tasks but can also identify changes to the COM in order to automatically route or include those certain personnel in relation to those particular tasks. In this fashion, PAUN 10 may dynamically modify the COM.

A still more detailed operation of the invention is depicted in the flow diagram presented as Figs. 4A and 4B. This diagram illustrates the functions which interactively lead either a receiver or an originator through first or second event chains, respectively, to accomplish a task. The selection of a particular event chain depends upon whether the task has been prompted or is to be user initiated, i.e., a "self-initiated" task.

Consider first a situation wherein a task is originated by a user, i.e., an originator. After the originator logs into the PAUN system, activation of a "hot key(s)" launches either the first or second event chains. As will be described in greater detail below, the logic sequence invoked for a user initiated task, i.e., tasks originated by an originator, begin at 33, depicted in Fig. 4B and labelled Non-Prompted Action. Upon activation, this first event chain causes an accounts menu to be displayed at Access Accounts Menu 60. The second event chain is launched when a user (receiver) receives a request for action from another user (originator). Such an event causes the display of a screen prompt at 32 in Figure 4A.

When a request for action is received by a receiver, i.e., a task initiated by an originator is received, PAUN 10 causes a flashing prompt to be displayed on

the receiver's screen. The system then launches the second event chain at 32. The second chain of events merges into the first chain at various points, depending upon how the receiver's task originated and upon the nature of the task.

The PAUN system, via tracker 11, automatically tracks all activities between originators and receivers by assigning relational codes. These codes identify the type of information being passed and all parties involved in its processing. Thus, through the codes, the system may monitor, ensure, actively direct and/or initiate inter-user activities. Moreover the PAUN system can process and verify tasks in a timely manner while minimizing disruption of other activities. In addition, the system can query the sum of activities over a given period and provide analytical summaries to management.

Referring now to Figure 4A, the second or prompted sequence of events will be described first. A receiver at a console or terminal is prompted by a screen prompt indicating at 32 that an action item to be accomplished has been received. As indicated by decision block 34, the Activate/Select function, the receiver is permitted to either answer a prompt for action or ignore it until later. Pressing a pre-programmed hot key(s), the prompt may be stifled for a certain interval. It is preferred for PAUN 10 to respond to successive activation of an ignore key by suppressing the prompt for increasingly longer periods.

When the prompt is ignored, PAUN 10 is in a holding state with regard to that receiver/task, which holding state is represented by block 36. While the prompt is being ignored by the receiver, the prompt for the action may remain on the screen. Preferably, the system will periodically sound an alarm to remind the receiver of the awaiting action item (task). If a prompt is being ignored and a second prompt is received, the second prompt can either be displayed in a second color, be displayed in cascaded relationship to the first prompt or indicated by flashing at intervals, etc.

When the receiver chooses to respond to the prompt the system displays a message at block 38 telling the receiver what the task entails. Preferably when the receiver accepts the prompt for action by pressing a pre-programmed hot key(s), a form or task template is automatically displayed on the receiver's screen. Additionally, the source of the task will be automatically identified along with any supporting files, i.e., history files.

At block 40, the receiver is prompted to select, after the receiver is provided the opportunity to understand the nature of the task and consider what will be involved in responding, whether to respond immediately or to store the request for later action. The receiver can immediately respond to the action (path 42) or put the task prompt aside for a later time (path 46). When the receiver selects "2 Store", the system places the request into a queue for later processing (block 48). The queue is displayed on the receiver's console or terminal. The task, or prompt for the task, is inserted in the queue at a location selected by the receiver. Accordingly, the receiver is allowed to decide the order in which assigned tasks will be addressed. The task may be retrieved by the receiver at any time preferably through activation of a pre-programmed hot key(s). After the request is stored, the system allows the receiver to continue previous processing as if no interruption occurred.

When a receiver selects "1 Immediate", the system places any current processing on hold and allows the receiver to respond to the request immediately. When the receiver chooses to respond to the action immediately, generally the receiver's current work can be either held in abeyance or moved to background processing, allowing the receiver to quickly respond to an urgent task and later return to the work that was interrupted or to permit the receiver to review those items currently stored in the que. For example, the system may store in memory, such as a random access memory (RAM) or in a disk memory device, the current application, account and file (block 44) and then exit the application

until a later time when the application will be restored as if no interruption had occurred.

It is noted at this point that regardless of whether a receiver has placed a task on hold or decides to handle a given task immediately, at indication block 50 PAUN 10 is either processing prompted tasks or messages or is processing non-prompted action. Moreover, received prompted tasks will have been either generated with no associated codes, some associated codes (e.g. without an application) or all codes (e.g. with an application).

In order to take action relative to certain tasks, PAUN 10 determines at 50 the nature of the task so that the task may be appropriately monitored. To this end, PAUN 10 determines whether the task is prompted with codes, a prompted "HOT ACTION" (a type of electronic mail) or is a non-prompted task. In other words, PAUN 10 determines the nature of the received message so that the task can be completed.

If it is determined at 50 that the message was generated as a "HOT ACTION" message, the task will be shunted at 70 to Complete Application block 88. A "HOT ACTION" task is one unaccompanied by an account number or application (e.g., spreadsheet, word processor) but may be accompanied by a response or dispatch code indicating whether and where the alert should be forwarded (or returned to the sender). This function of providing a response or dispatch code is preferably invoked by the system automatically (subject to user override) whenever a document accompanies the request message. Recognition of the relational codes attached to the request message causes the system to enable the relevant account and application. The application is initiated and the relevant document is made active at Complete Application 88, at which point the receiver may use the application to take whatever action is appropriate for dealing with the presented task.

If it is determined at 50 that the prompted task is a prompted document with codes, the system shunts the task

through block 54 to Complete Application 88. The codes provided with the prompted task indicate an application and an account number that have been associated with the task when generated by the originator. Thus, the receiver need not go through the process of having account and application codes assigned to the task. In addition, a response (or dispatch) code may be included. This code indicates whether the originator is to be automatically notified at each stage of completion of the task and whether a copy (or image) of the completed task (i.e., work product) is to be automatically sent to the originator. For a more detailed explanation, see the discussion below in relation to block 106.

Finally, if it is determined at 50 that the prompted task is without any codes, for example an outgoing memo which is not expected to have responses coming back, the task will be routed through block 58 so that PAUN 10 may assign appropriate account codes and application codes via associator 60 and 62 and application selection blocks 64-77 shown in Fig. 4B. For example, the receiver is prompted at 60 with a menu of relevant accounts for the task, from which the receiver chooses one account. The associator portion of PAUN 10 assigns a code at 62 in relation to the selected account, which code is appended to the task. This account code facilitates later display and retrieval. The receiver is prompted at 64 with an applications menu from which one application program is selected.

As illustrated in Fig. 4B, application programs may include a word processor program, a spreadsheet program, an electronic mail program, or any other installed application program (see blocks 72-77). It is again noted that a non-prompted task, e.g., one originated by an originator, also passes through the process denoted by blocks 60-77. After the application selection is made, the system automatically compiles a search code consisting of application, account and user identifiers and associates such identifiers to the task.

At retriever 78, after an application has been selected, relevant files are automatically located and displayed, preferably in a cascaded page format. The manner in which the relevant files are determined by the system is described in greater detail below in relation to Fig. 5. Briefly, PAUN 10 selects all files relative to the selected application and account and preferably dealing with immediately related subject matter, e.g., a letter of complaint to a vendor of a damaged part. The system may also select related documents associated with other accounts but dealing with similar subject matter. To this end, the receiver will be prompted with files having either the same account codes or different account codes but similar key words, i.e. after the associator associates an identifier to information entered at one terminal, retriever 78 retrieves information stored in said storage device wherein the information to be retrieved has an identifier (codes) having a desired relationship to the current identifier.

As will be described below, files to be retrieved are stored in several ways, one of which is in an archive. If insufficient electronic information exists in the memory or storage devices readily accessible, i.e., short retrieval time delay, the user may be prompted that it will be necessary for PAUN 10 to retrieve information from an archive source.

At block 80, the receiver is prompted to select one of three courses of action. The receiver can: (1) choose to utilize related files or documents (path 90, blocks 92, 94); (2) start a new file or document (path 82, blocks 84, 86); or (3) transfer the task to a further receiver with a memo code identifying the task (path 96, block 98), the latter selection preferably causing the system to prompt the receiver to type a transfer message, specify the destination and identify a file for transfer with the message.

If the receiver chooses to use an existing file, the application, determined by previously assigned application codes, is launched or started at 92. The

receiver can either modify the file or use it as is at 94 and the receiver thereafter completes the task at 88 (Fig. 4A) with the selected application.

If the receiver chooses to start a new file, the application is launched at 84 and the receiver creates a completely new file or document at 86. The task is then completed with the new file at 88 (Fig. 4A).

Referring again to Fig. 4A, it is noted that the system allows the receiver at 88 to backstep through the preceding process (e.g., back to block 38) to determine what choices were made in relation to the assigned task. The receiver may also recall the related files or documents in the display history at 78. When performing the Complete Application function at 88 within the parameter of a given application, preferably the receiver may activate a pre-programmed hot key(s) that causes the system to exit the application. In such a situation, PAUN 10 automatically creates a code to be appended to the file identifying the application, account and originator.

To transfer a task, the receiver preferably can activate a pre-programmed hot key(s) that causes a similar tracking code to be connected to the task and any associated documents.

The file used to accomplish or complete an assigned task is automatically saved in its entirety at 100. The saved file can have several forms, namely, a new file which has not been modified or an existing file which has either been used as is or modified. Even "HOT ACTION" messages are saved. It is preferred that in addition to the original file, only changes to an original file be saved, rather than saving each form of the same file in its entirety. By saving information in this manner, storage capacity is maximized. Moreover, by saving all changes to an original file, it is possible for tracker 11 (Fig. 3) to track or monitor who contributed what to the completion of each task.

As will be explained in greater detail below, sequential identifiers are used in order to save such

information. It is also noted that all files, including data, documents and messages, are saved in accordance with a prescribed nomenclature, an example of which is described in greater detail in relation to Figs. 6 and 7. Naming files in accordance with a prescribed nomenclature is advantageous in that it allows PAUN 10 to efficiently locate related files. Of course, the selected nomenclature should be one that allows the system to achieve this goal.

At 102, the receiver is prompted to select one of three possible post-application actions: RESPONSE (104 and 106); SHIP (110 and 112); or MAIL (114 and 116). With the RESPONSE selection at 104, the display of a file used to accomplish the assigned task is sent to the originator at 106. With the SHIP selection at 110, the receiver may send the task to an alternate receiver with a response code (block 112) which response code indicates whether a copy of the resulting work product or verification of completion is to be returned to the originator. With the MAIL selection at 114, a letter is sent to an appropriate individual (e.g., a vendor), preferably through the organization's mail department (block 116). As indicated by the line to block 100, a response message will be automatically sent to the originator when activity is completed if the task was a prompted task.

At block 108, PAUN 10 causes a prompt associated with the resulting file or task to be displayed on the alternate receiver's or originator's console or terminal via LAN 12.

Referring to Fig. 4B, a user (originator) can also initiate a task without a prompt at 33. Since the process depicted in Fig. 4B was described above in relation to a receiver receiving a task having no account codes and since that process is the same when invoked by an originator at 33, it will not be repeated herein.

Referring now to Fig. 5, the procedure by which PAUN 10 selects and displays related file history is disclosed. This procedure corresponds to block 78 of Fig. 4B

(blocks immediately preceding and following block 78 are shown as well). It will be recalled that at 78, PAUN 10 displays all files immediately or directly relevant to the selected application and account. At 126 the system automatically locates historical records related to the task at hand, taking into consideration the user's identification number, the account and application codes. These records are then displayed at 128 on the user's terminal, preferably in a cascaded page format in date order of occurrence such that the title of each record is displayed in a single display. At 132 the user may indicate whether any other files, e.g., files related to another account need to be displayed. If other files are necessary, such other files are automatically located at 130 and displayed. In locating such other files, locator 126 preferably uses a recognizer capable of recognizing desired characteristics in the information stored in memory. For example, locator 126 may recognize relationships, phrases, words contained in fields defined within such files, words contained in full text or statistical occurrences.

The location of additional files at block 130 may advantageously be accomplished by artificial intelligence software or pattern recognition software. Since the particular artificial intelligence or pattern recognition programs can have any desired form, they are not disclosed herein.

In relation to the file retrieval process described above, it has been assumed that retrieval of information can occur from a readily accessible source, i.e., a hard disk memory device. However, it is preferred for the PAUN to store information in three levels, namely, immediate, intermediate and archive levels. Each level being distinguishable by the use associated with the information being stored. For example, immediate storage could include information used most frequently, intermediate storage would include information used less frequently and archive storage would include the least frequently used information. Archive

storage would utilize more long term oriented storage devices such as optical disk storage devices. Information usage levels defining the various storage levels would be determined at the time the COM is created or could be modified by the corporate operations administrator at some later time.

Fig. 6 illustrates a typical file storage convention (or hierarchy) for use by PAUN 10. The PAUN accesses individual files through LAN 12 via a root directory 160, user directory 162, account subdirectory 164 and application subdirectory 166. A database 161, comprising a portion of the corporate operations map (COM) data may also be accessed through the root directory. In this way particular files may be retrieved at 168.

Fig. 7 depicts one example of the directory structure which may be utilized in PAUN 10. This exemplary structure, which enables quick location of a particular file, is defined by the COM. The hierarchy includes the root directory; multiple user subdirectories (e.g., USER 1 - USER 4); multiple account subdirectories (ACCOUNT 1 - ACCOUNT 7); multiple application subdirectories (APPLICATION 1 - APPLICATION 3); and individual files under the application subdirectories. For example, account subdirectory ACCOUNT 2 may have application subdirectory APPLICATION 1 under which spreadsheet files are stored and a second application subdirectory APPLICATION 2 under which word processor files (documents) are stored. As shown in Fig. 7, individual files 00000001.AAA, 00000002.AAA and 00000001.AAB may be stored under APPLICATION 2. The root, user, account and application subdirectories are organized to reflect a particular organization, which organization, as described above, is reflected in the COM.

It will be appreciated from the above that PAUN 10 enables recordation of virtually all communication and effort by the individuals making up an organization. Such recordation facilitates the provision of information by PAUN 10, previously unavailable, relating to who in an

organization does what and how quickly as well as how work actually flows in order to get various tasks accomplished. In order for such recordation to be of use, PAUN 10 provides a framework by which information can be stored and retrieved. Although not a part of the present invention, PAUN 10 also permits the use of artificial intelligence software or pattern recognition software to predict or evaluate organization efficiency. The framework in which information is recorded and tracked by PAUN 10 will now be described.

The installation of the PAUN system is accomplished by the completion of the Corporate Operations Map (COM), an Applications Menu (AM), an Account/Project menu (A/P) and a Ship/Receive menu (S/R). The implementation and function of these portions of PAUN 10 are discussed below.

As indicated previously, the COM comprises a generic map of operations for the specific corporation or organization type, e.g., manufacturing, including locations of persons, location of departments and a definition of where work should flow between various departments. During installation, selecting, i.e., clicking on, a department title will bring up the department entry screen with four fields to be completed.

1)	DEPARTMENT Title	AAAAAAA
2)	DEPARTMENT Code	000000
3)	NETWORK NODE Code	000000
4)	TERMINAL Codes	000000

In addition, a USERS database having various fields for each user assigned to a department must also be completed during installation.

USERS Data

1)	USER Code	00000000
2)	TERMINAL Code	000000
3)	DEPARTMENT Code	000000
4)	ROOM Code	000000
5)	PHONE Number	0-000-000-0000

The Applications Menu (AM) is also a pre-installed part of the PAUN with software for calling or enabling use of each major function or application (word processing, spreadsheet, etc.). The directory and AM code for each

application is also predefined. Exemplary applications data is defined as follows:

AM Data

1)	Application Name	WordPerfect
2)	Application Code	00000000
3)	Location in Directory	C:\WP\
4)	Run Command and Switches	WP
5)	Type of Application	Word Processor

The S/R database is used by tracker 11 to keep track of all USER interaction. This data base is not completed during installation, rather, information is entered by PAUN 10 in relation to work flow occurring within and between departments. It comprises fields as follows:

S/R Data

1)	SOURCE User	00000000
2)	ALTERNATE User	00000000
3)	TIME IN	00:00
4)	APPLICATION Code	00000000
5)	TIME OUT	00:00
6)	DATE	00:00
7)	ACCOUNT Code	00000000
8)	TASK/PROJECT Code	000000
9)	RETURN (logical)	L
10)	DESCRIPTION	(1 line DESCRIPTION)
11)	FILE NAME	00000000.AAA

The A/P database comprises fields to be completed by a person responsible for operations management. These fields are as follows:

A/P Data

1)	ACCOUNT Code	00000000
2)	ACCOUNT Entry Code	00
3)	ACCOUNT Name	78 Characters
4)	ACCOUNT Address1	50 Characters
5)	ACCOUNT Address2	50 Characters
6)	ACCOUNT City	50 Characters
7)	ACCOUNT State	2 Characters
8)	ACCOUNT ZIP	00000-0000
9)	ACCOUNT Country	AAAAAAA
10)	CONTACT Person	50 Characters
11)	TITLE	50 Characters
12)	PHONE Code	0-000-000-0000
13)	MAILING Address	50 Characters
14)	Notes	MEMO

Although all files are named by the PAUN system, they are not accessed by users with these names. Preferably,

the user or originator will define a two-line description to express file content from which the file may be accessed by users. It is also preferred for the PAUN to name the files sequentially starting with "0000001.AAA" for access by the PAUN. To maintain the order of the files, they are stored in accordance with their USER, ACCOUNT and APPLICATION codes. The following demonstrates an exemplary implementation of the file storage structure:

```
ROOT (C:\)
   |
   USER DIRECTORY (USER NUMBER)
        |
        ACCOUNT SUB-DIRECTORY (ACCOUNT Number)
             |
             APPLICATION SUB-DIRECTORY
              (Application Number)
              |
              FILES (0000001.AAA)
```

When a file is sent from the original SOURCE USER to the first ALTERNATE USER, the complete file is first saved in memory and an image is sent across the network. When a file (actually a copy or image of the file) is sent from the original SOURCE USER to an ALTERNATE USER, the file is renamed by the PAUN with the next sequential code of the ALTERNATE USER, ACCOUNT and APPLICATION. This same renaming will be done upon return of the file to the task's originator. This naming and renaming function can be seen in the first example below. The original file is saved in its entirety in association with the name 00000001.AAA. An image is forwarded to ALTERNATE USER 65 and renamed 00001234.ACC. Preferably only changes to the image of the original file will be saved in association with this new name. Upon return to SOURCE USER 23, the current image is renamed 00000002.AAA.

When a file is sent from one ALTERNATE USER (sender) to another ALTERNATE USER (receiver), as shown in the second example below from user 65 to user 135, preferably only changes to the received file image are saved to memory and the image, as revised, is sent across the network. Again, such changes are saved in relation to the name given to the image when received.

The PAUN's database is thus capable of reflecting the various paths taken by the file and all changes made along the way. For example, if file 00000001.AAA is sent to ALTERNATE USER number 65 (e.g., Jim Smith in the engineering department), the SOURCE USER number is stored in the USER field of the S/R database. The time sent out, date, account, task/project and description data are automatically entered into respective fields. The RETURN field is a logical value indicating whether the file or any verification is to come back to the SOURCE USER (originator).

PAUN 10 preferably will include operations limitations defining a series of parameters relating to the overall use and transfer of information within the organization. Computer operations falling outside such parameters in a consistent or statistically significant manner may be an indication that the dictionary of operations (COM) need be changed or overridden. For example, if the number of times information is indirectly forwarded from a receiver to another user in relation to a particular account can be an indication that the dictionary of operations needs to be modified so that the subject information is forwarded directly to that user.

It is within the scope of the invention for the tracker (Fig. 3) to cause PAUN 10 to either provide an indication of changes to be made to the dictionary of operations or to adaptively change the dictionary of operations whenever exceeding the operations limitations approaches some threshold. In such an embodiment it is also preferred for PAUN 10 to be provided with an override capability for overriding the automatic transmission of information and for directing the routing of information. As will be seen below, PAUN 10 provides for the information stored in the tracker (S/R data base) to be generated.

EXAMPLES:

SOURCE USER (originator) 23 with Word on 10/12/92 at 3:45 PM concerning ACCOUNT 1453 with project 102 (including

description) sent to ALTERNATE USER (receiver) 65 and to be returned.

S/R Data

SOURCE USER	23	65	23
ALTERNATE USER	65	23	0
TIME IN	0	15:50	19:25
FILE NAME	00000001.AAA	00001234.ACC	00000002.AAA
TIME OUT	15:45	17:20	0
DATE	10/12/92	10/12/92	10/12/92
ACCOUNT Number	1453	1453	1453
TASK/PROJECT No.	102	102	102
RETURN(Logical)	Y	Y	Y
DESCRIPTION	Client Name	Client Name	Client Name
APPLICATION No.	2	2	2

This example demonstrates a simple SEND to one ALTERNATE USER. Note that the time the file was sent (15:45) (first column) from the SOURCE USER is different from the time received (15:50) by the alternate user (second column). This shows a 5 minute delay before the alternate user responded to the task prompt on the screen. The alternate user worked on the file from 15:50 to 17:20 and then returned the file to the source user at 19:25 (third column). The ALTERNATE USER (65) could have sent this project to another alternate user if desired. The RETURN field being fixed as "Y" indicates that the work product or verification (i.e., an image of the work product) must be returned to the SOURCE USER or originator. The return path is the reverse of the send path. This is demonstrated below:

S/R Data

	23	65	135	65	23
	65	135	65	23	0
	0	10:3 0	13:46	15:17	17:05
	000001.AAA	001234.ACC	818716.FGN	001235.ACC	000002.AAA
	09.45	13:45	15:07	16:45	0
	10/12/92	10/12/92	10/12/92	10/12/92	10/12/92
	1453	1453	1453	1453	1453
	65	65	65	65	65
	Y	Y	Y	Y	Y
	Clnt Name	Clnt Name	Clnt Name	Clnt name	Clnt Name
	2	2	2	2	2

The data above indicates three contributors to the file and the return of the file to the originator. It should be noted that the file storage format discussed herein is one

preferred format and that other formats are also possible. For example, another possible format is to construct a name by using an extract of the ACCOUNT NAME, APPLICATION and PROJECT NAME. A simple combination of the first three letters of each to construct a file name may be used. If a conflict in name exists, the next three-letter group may be selected from the SOURCE. It is also conceivable that only an elaborate naming convention be utilized, without multiple sub-directories.

While the invention has been described and illustrated with reference to specific embodiments, it will be recognized that modification and variations may be made without departing from the principles of the invention as described herein above and set forth in the following claims. For example, the PAUN system described herein could advantageously be provided with an artificial intelligence feature or a pattern recognition feature, not previously described, for identifying potentially useful files for automatic retrieval in connection with a particular task (i.e., to be invoked at block 78 of Fig. 4B) and/or a security system for denying users access to certain confidential data, e.g., data regarding another user's activities.

The PAUN system could also advantageously be combined with a physical location device for physically locating individuals and/or objects (finished inventory or raw materials). In such a combination, PAUN 10 could find an individual and either prompt an input/output device conveniently located to the individual or generate some form of audio or video message at the individual's location.

The PAUN system could also advantageously be operated with voice activation devices used as the input/output devices.

Claims

What is claimed is:

1. A proactive system for assisting the computer operations of an organization, said computer operations including first and second input/output devices, said proactive system comprising:

a dictionary of operations of said organization;

an organizer for organizing information entered at said first input/output device in accordance with said dictionary of operations; and

a transmitter for transmitting information organized by said organizer to said second input/output device whenever the organization of information in accordance with said dictionary requires said information to be transmitted to said second input/output device.

2. The system of claim 1, wherein said organizer comprises an associator for associating a current identifier to said information entered at said first input/output device while said information is being organized in accordance with said dictionary.

3. The system of claim 2, further comprising a storage device for storing information organized by said organizer together with the identifier associated with said information.

4. The system of claim 3, wherein said organizer further comprises a retriever, wherein after said associator associates an identifier to information entered at said first input/output device, said retriever retrieves information stored in said storage device wherein the information to be retrieved has an identifier having a desired relationship to the identifier currently associated by said associator.

5. The system of claim 4, wherein said retriever only retrieves a portion of the information stored in said storage device associated with a given identifier.

6. The system of claim 4, wherein said retriever is provided with an identifier parameter and wherein information is retrieved by said retriever which information is associated with an identifier falling within said identifier parameter.

7. The system of claim 6, wherein said identifier parameter comprises a plurality of identifiers.

8. The system of claim 1, further comprising a storage device for storing information organized by said organizer and a locator for providing a prompt at said second input/output device and for locating information stored in said storage device upon receiving a response to said prompt at said second input/output device.

9. The system of claim 8, wherein said locator comprises recognition means for recognizing desired characteristics in the information stored in said storage device.

10. The system of claim 9, wherein said recognition means recognizes relationships.

11. The system of claim 9, wherein said recognition means recognizes phrases.

12. The system of claim 9, wherein the information stored in said storage device is stored in relation to fields and wherein said recognition means recognizes information contained in said fields.

13. The system of claim 9, wherein the information stored in said storage device comprises text information and wherein said recognition means recognizes words contained in said text.

14. The system of claim 9, wherein said recognition means recognizes statistical occurrences.

15. The system of claim 1, wherein the entering of information at said first input/output device and the transmission of information to said second input/output device define computer operations activity, said system further comprising a tracker for tracking said computer operations activity.

24. A software product recorded on a recording medium, said software product comprising a plurality of instructions for controlling the operation of a computer network comprising a plurality of terminals and data storage devices operatively interconnected with each other, said software product comprising:

storage instructions for storing data input at said terminals and retrieving data for display on said terminals;

task instructions for generating and transmitting task related information originated by a first user at a first terminal to a second user at a second terminal, said task related information being indicative of a task assigned to said second user; and

identification instructions for identifying data relevant to said task and displaying the relevant data on either said first or second terminal, the displayed data being useful in accomplishing the assigned task.

25. The software product recited in claim 24, wherein said task instructions generate an account code indicative of an account with which said assigned task is associated; said storage instructions storing being operative for storing a plurality of files, each file being located or named such that the user who created it, the account to which it relates and the application with which it was created are determinable from the file's name or location; and said identification instructions being operative to present an image to said second user of each file whose location or name bears a prescribed relation to said task related information.

26. The software product recited in claim 25, wherein said task instructions further generate a response code indicating whether the first user is to be automatically notified of the completion of the task.

27. The software product recited in claim 24, further comprising forwarding instructions for forwarding said task related information from said second user to a third user at a third terminal.

28. The software product recited in claim 27, further comprising code controlling said network in automatically recording data indicative of the time said task related information was sent from said first user to said second user and the time the task was either completed by said second user or the task related information was forwarded by said second user to said third user.

29. The software product recited in claim 24, further comprising code controlling said network in storing task related information sent to said second user in a queue and displaying said queue on said second terminal.

30. A method for controlling the operation of a computer network comprising a plurality of terminals and a data storage means operatively interconnected with each other, said method comprising the following steps:

(a) storing data input at said terminals and retrieving data for display on said terminals;

(b) generating and transmitting task related information originated by a first user at a first terminal to a second user at a second terminal, said task related information being indicative of a task assigned to said second user; and

(c) automatically identifying data relevant to said task and displaying the relevant data on said second terminal, the displayed data being useful to said second user in accomplishing the assigned task.

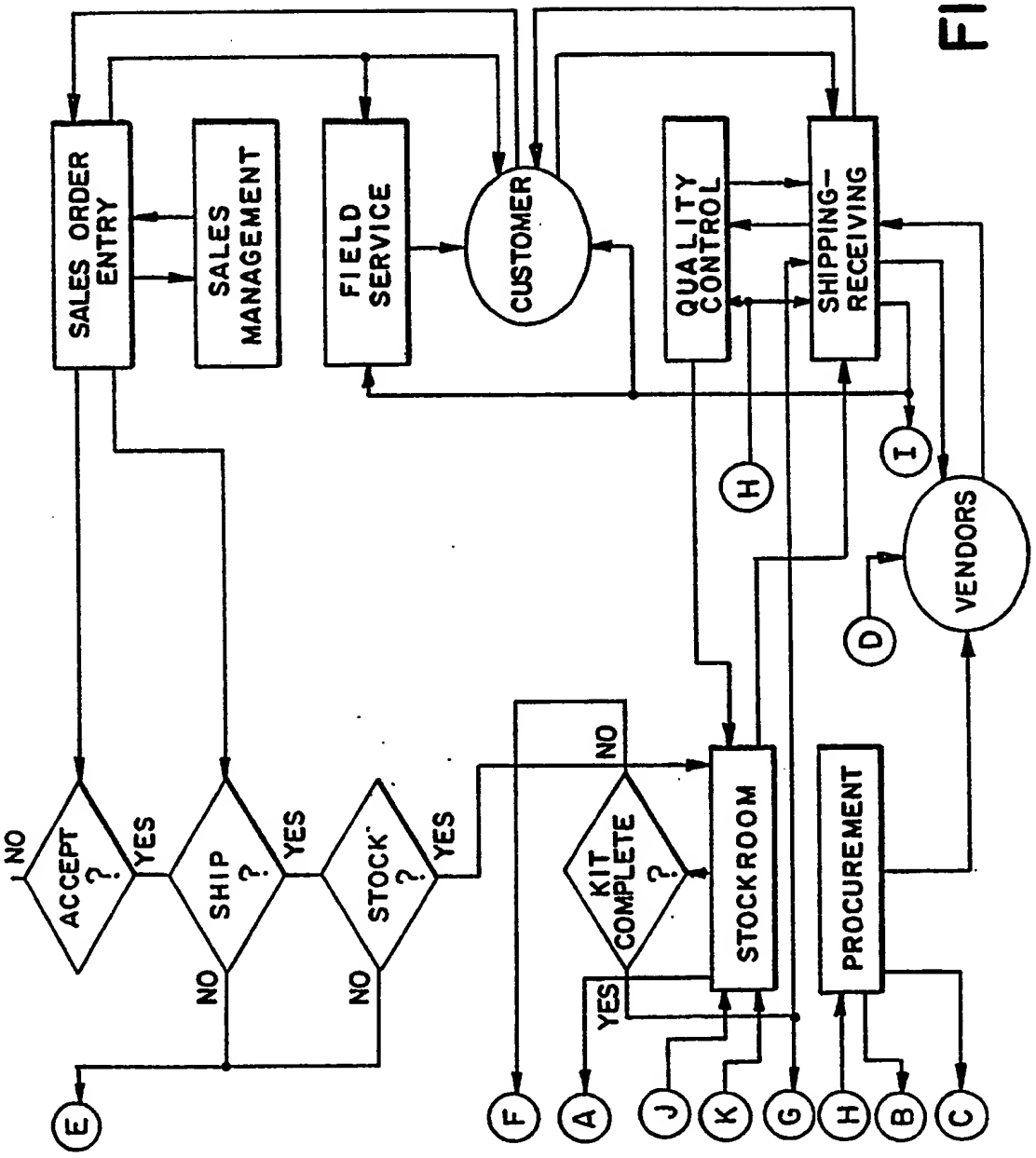
SALES ORDER ENTRY
SALES MANAGEMENT
FIELD SERVICE
CUSTOMER
QUALITY CONTROL
SHIPPING-RECEIVING
VENDORS
ACCEPT ?
SHIP ?
STOCK ?
KIT COMPLETE ?
STOCKROOM
PROCUREMENT
YES
NO
A
B
C
D
E
F
G
H
I
J
K

FIG. 1B

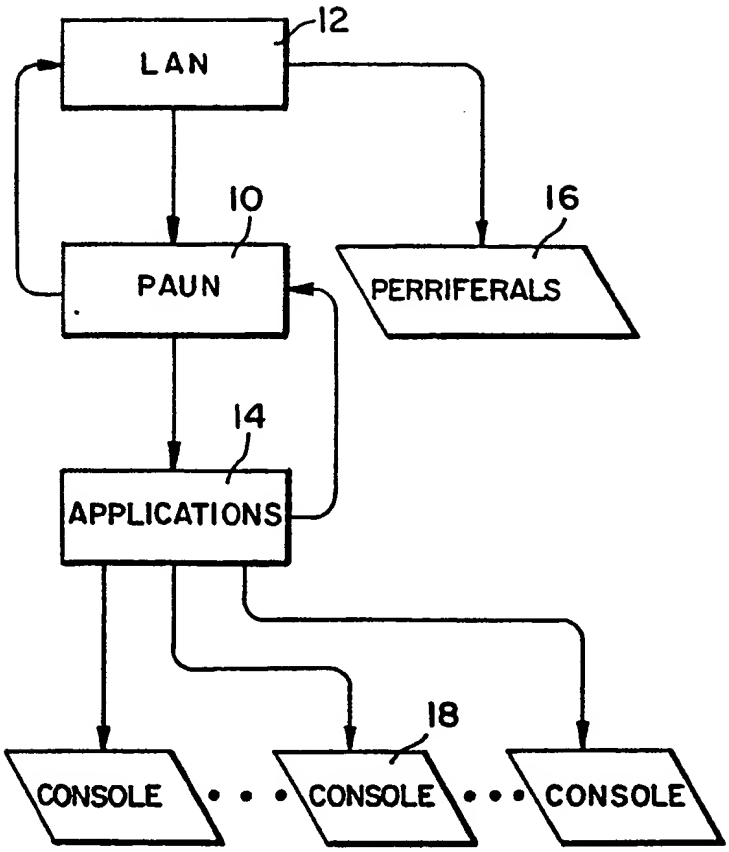
LAN
12
PAUN
10
PERRIFERALS
16
APPLICATIONS
14
CONSOLE
CONSOLE
CONSOLE
18

FIG. 2

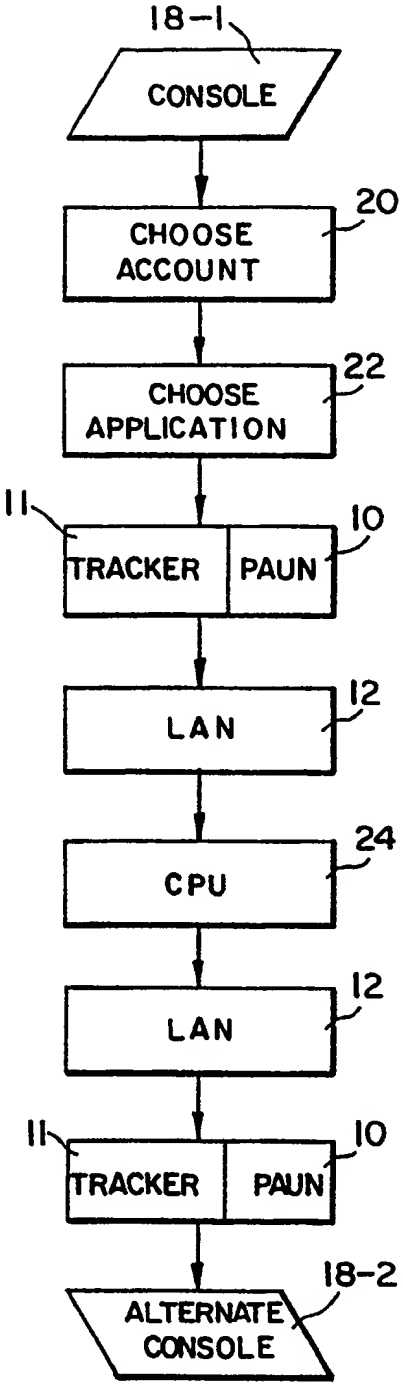
18-1
CONSOLE
CHOOSE ACCOUNT
20
CHOOSE APPLICATION
22
11
TRACKER
PAUN
10
LAN
12
CPU
24
LAN
12
11
TRACKER
PAUN
10
ALTERNATE CONSOLE
18-2

FIG. 3

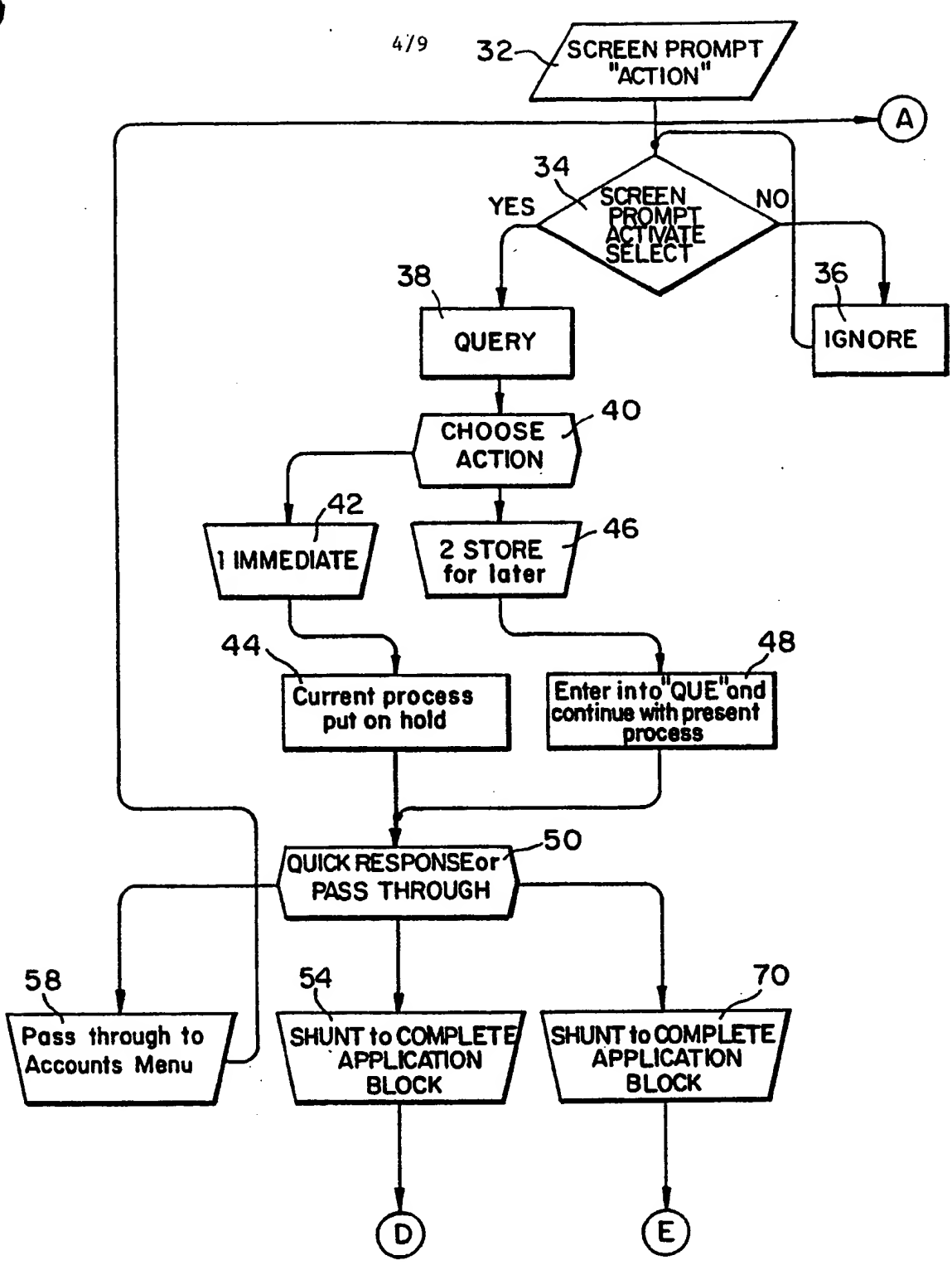
32
SCREEN PROMPT "ACTION"
A
34
SCREEN PROMPT ACTIVATE SELECT
YES
NO
38
QUERY
36
IGNORE
40
CHOOSE ACTION
42
1 IMMEDIATE
46
2 STORE for later
44
Current process put on hold
48
Enter into "QUE" and continue with present process
50
QUICK RESPONSE or PASS THROUGH
58
Pass through to Accounts Menu
54
SHUNT to COMPLETE APPLICATION BLOCK
70
SHUNT to COMPLETE APPLICATION BLOCK
D
E

FIG. 4A

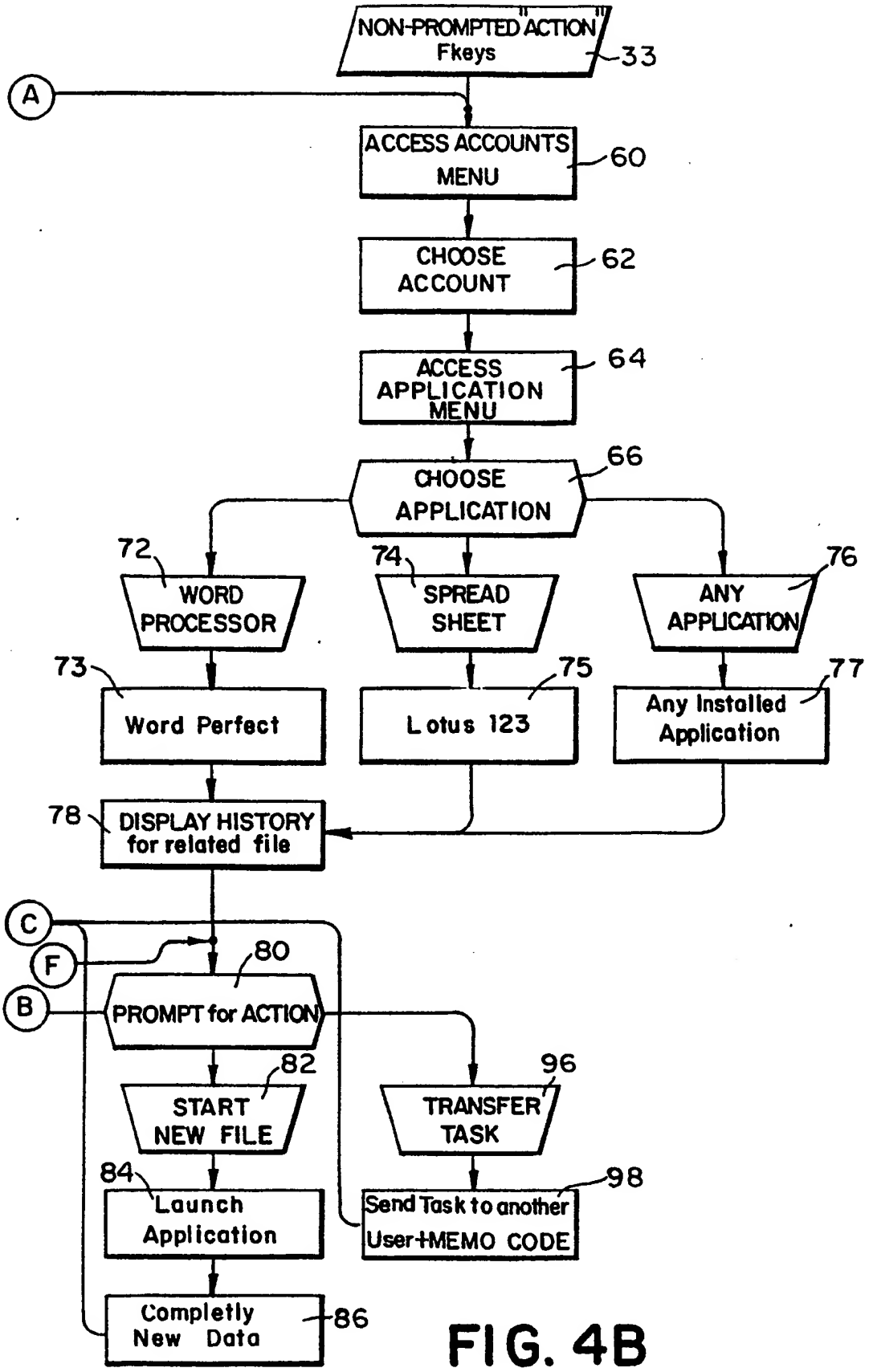
NON-PROMPTED ACTION Fkeys
33
A
ACCESS ACCOUNTS MENU
60
CHOOSE ACCOUNT
62
ACCESS APPLICATION MENU
64
CHOOSE APPLICATION
66
72
WORD PROCESSOR
74
SPREAD SHEET
76
ANY APPLICATION
73
Word Perfect
75
Lotus 123
77
Any Installed Application
78
DISPLAY HISTORY for related file
C
F
B
80
PROMPT for ACTION
82
START NEW FILE
96
TRANSFER TASK
84
Launch Application
98
Send Task to another User+MEMO CODE
Completly New Data
86

FIG. 4B

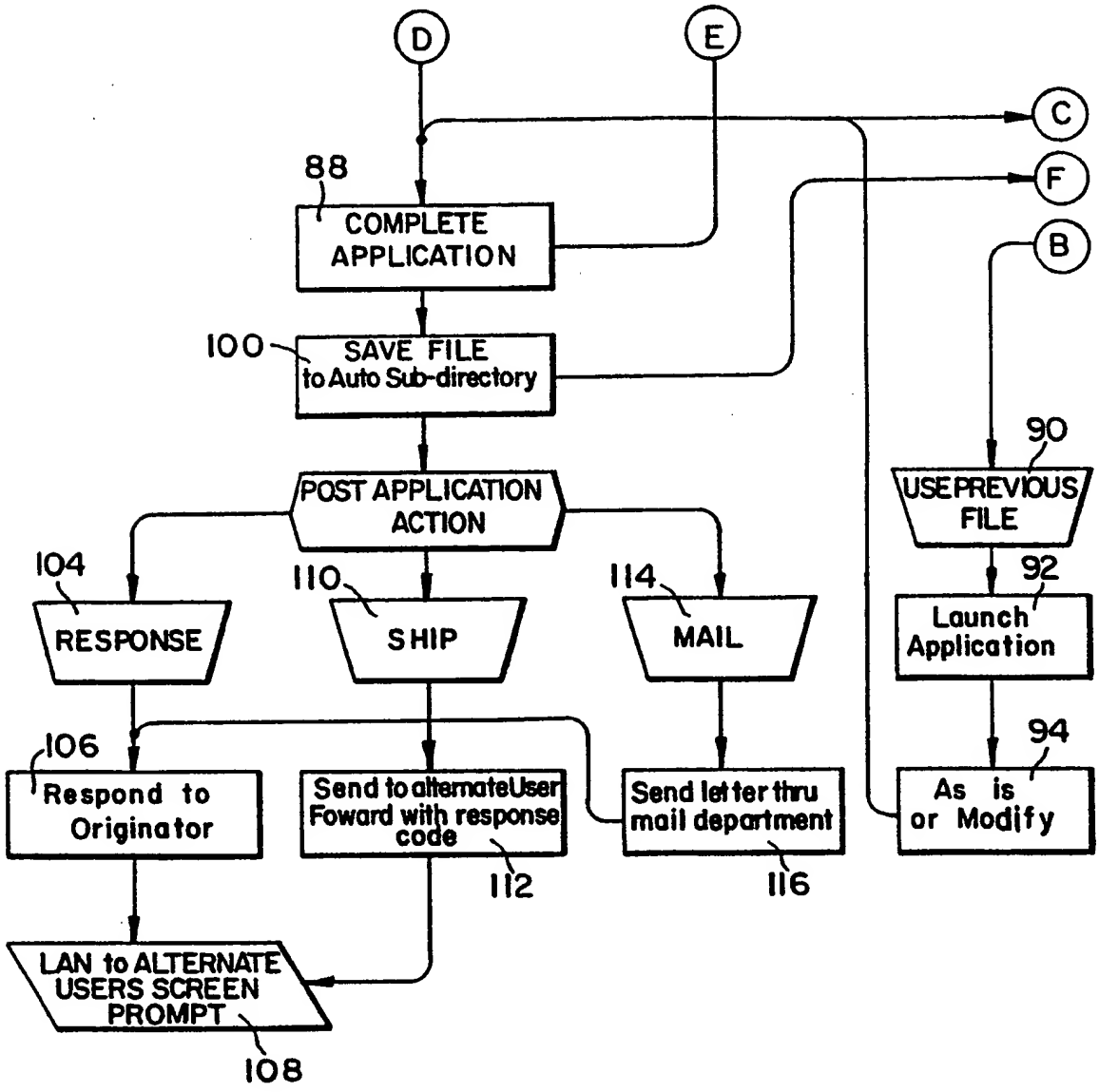
D
E
C
F
B
88
COMPLETE APPLICATION
100
SAVE FILE to Auto Sub-directory
POST APPLICATION ACTION
90
USE PREVIOUS FILE
92
Launch Application
94
As is or Modify
104
RESPONSE
110
SHIP
114
MAIL
106
Respond to Originator
Send to alternate User Foward with response code
112
Send letter thru mail department
116
LAN to ALTERNATE USERS SCREEN PROMPT
108

FIG. 4C

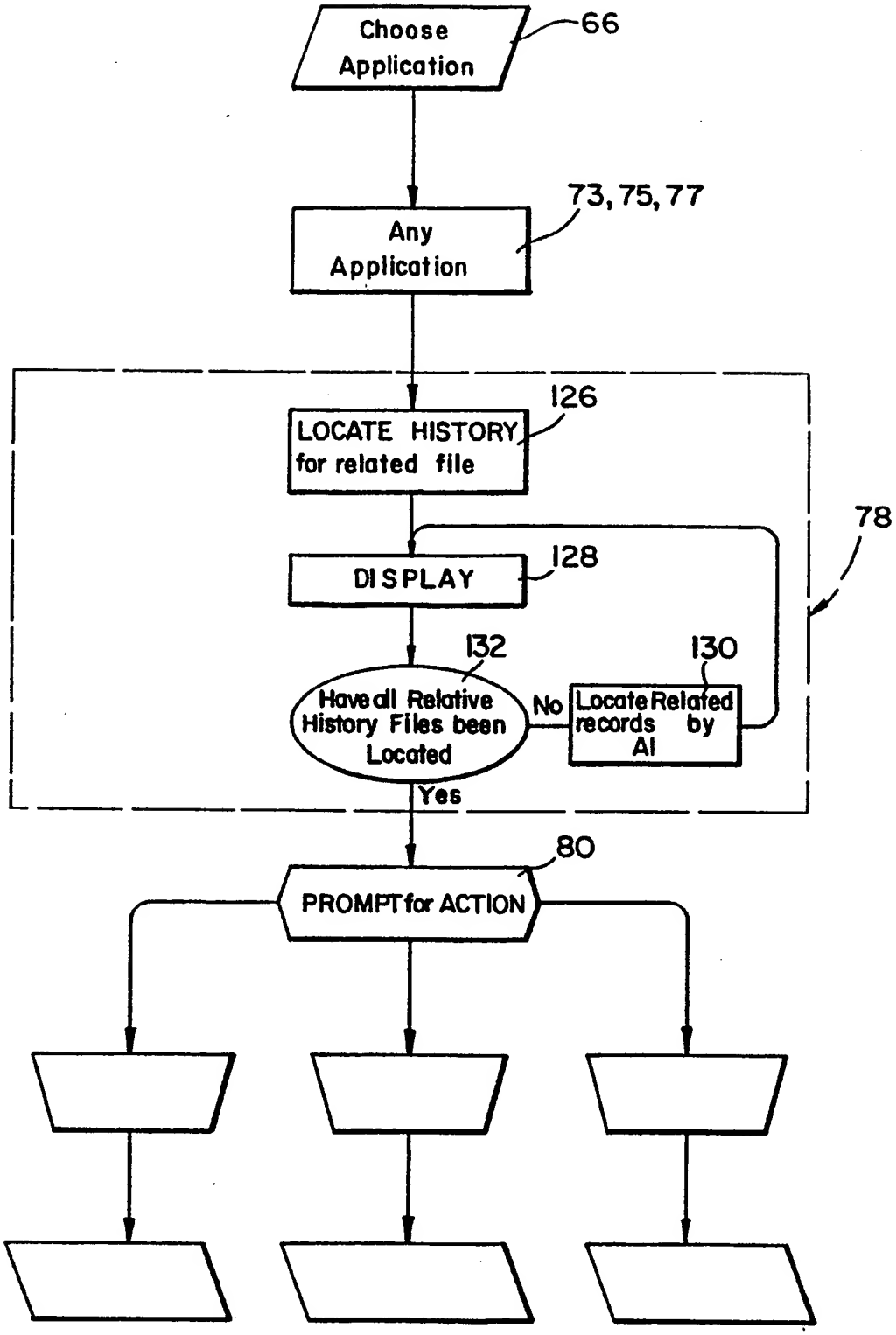
Choose Application
66
Any Application
73, 75, 77
LOCATE HISTORY for related file
126
78
DISPLAY
128
132
130
Have all Relative History Files been Located
No
Locate Related records by AI
Yes
80
PROMPT for ACTION

FIG. 5

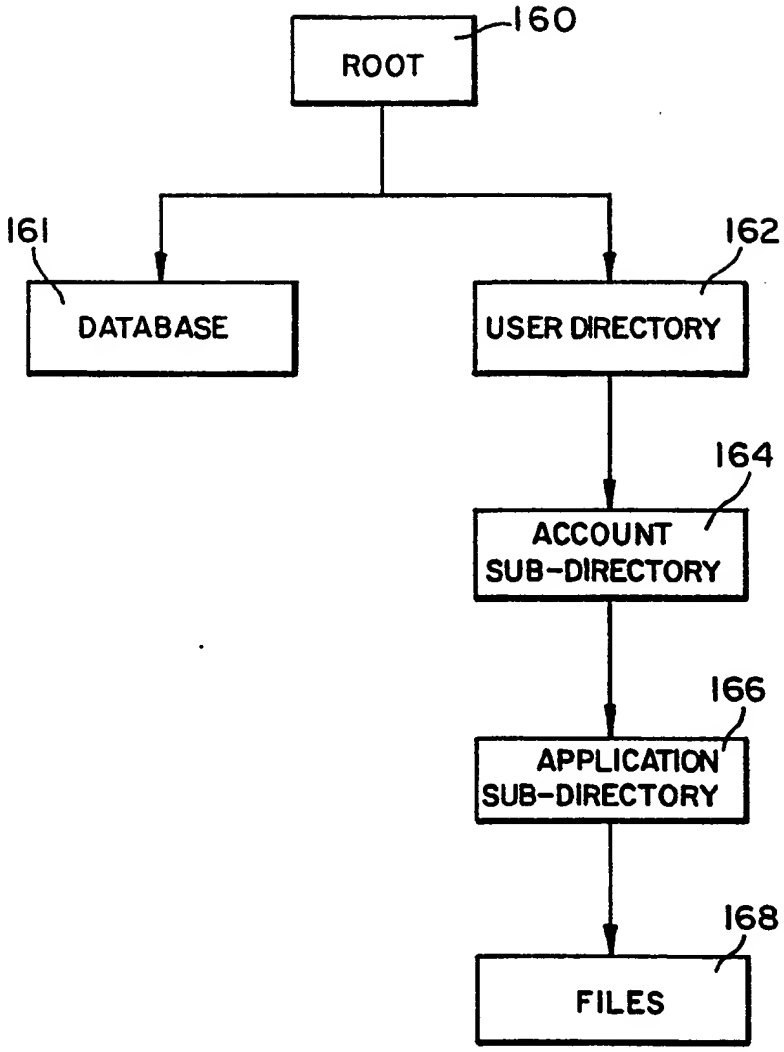
160
ROOT
161
DATABASE
162
USER DIRECTORY
164
ACCOUNT SUB-DIRECTORY
166
APPLICATION SUB-DIRECTORY
168
FILES

FIG. 6

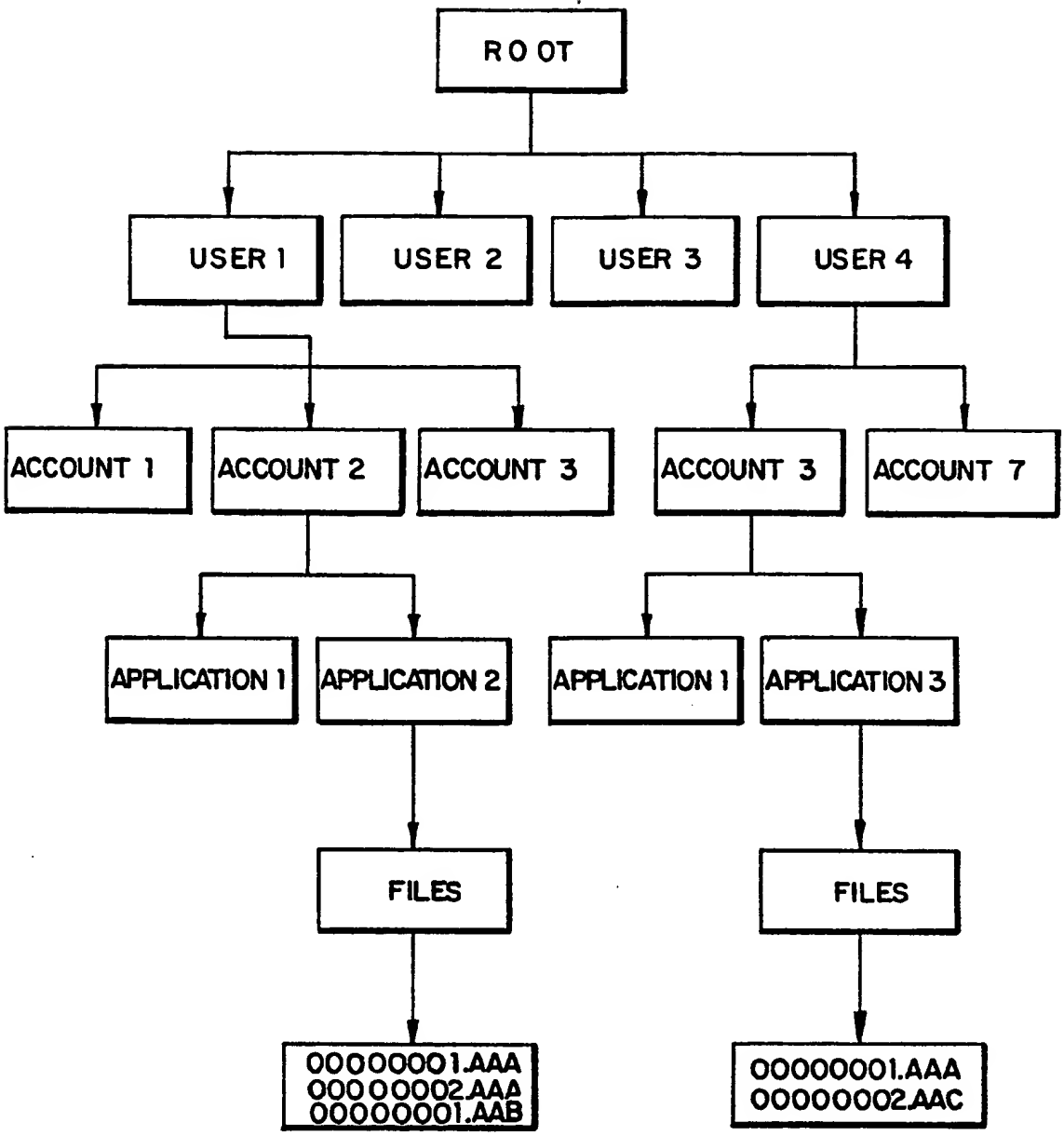
ROOT
USER 1
USER 2
USER 3
USER 4
ACCOUNT 1
ACCOUNT 2
ACCOUNT 3
ACCOUNT 3
ACCOUNT 7
APPLICATION 1
APPLICATION 2
APPLICATION 1
APPLICATION 3
FILES
FILES
00000001.AAA
00000002.AAA
00000001.AAB
00000001.AAA
00000002.AAC

FIG. 7